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An Extensible Markup Language (XML) Strategy for Focused Logistics

Background and Value of Standards Development and Management

by

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Abstract

Accurate, up-to-date information concerning transportation and movement of forces, equipment and supplies is critical to the success of a Joint Task Force. Joint Vision 2020 outlines the concept of Focused Logistics, which calls for total asset visibility (TAV). The primary provider of TAV will be the United States Transportation Command (USTRANSCOM) which is responsible for the Defense Transportation System (DTS). Critical to TAV throughout the DTS cycle is the implementation of web-based standards.

The World Wide Web has changed the way the world, including the Department of Defense (DoD), thinks about and views information. The ability to access and use information rests on information technology (IT) standards. One standard that has seen recent widespread acceptance is the Extensible Markup Language (XML).

This research paper addresses two important questions related to the proliferation of XML specifications throughout industry and the DoD. First, what are the current industry and DoD trends in transportation related XML standards development? Second, should USTRANSCOM interact with the IT standards development community in order to influence the XML standards development process?

Chapter 1

Introduction

The last ten years have seen unprecedented change in the evolution of information technology (IT), in both the Department of Defense (DoD) and our civilian society. The creation of the Internet and the World Wide Web (WWW) has enabled unheard of connectivity and communication possibilities on a global scale. Yet, Joint Vision 2010's (JV2010) prophecy of Focused Logistics enabled by information superiority is still just a vision. Focused Logistics is defined by Joint Vision 2020 (JV2020), the follow-on document to JV2010, as "the ability to provide the joint force the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity, across the full range of military operations." JV2020 goes on to define a key component in the Focused Logistics transformation path; the implementation of a web-based, shared data environment to ensure the joint warfighters' ability to make timely and confident logistics decisions. The magnitude of this task is daunting when considering the sheer volume of legacy systems and data that must be integrated.

In 1999, as a response to documents such as JV2010 and JV2020, US Transportation Command (USTRANSCOM) undertook a significant effort to identify the "As-Is" Defense Transportation System (DTS). The DTS is the foundation for rapid, global mobility. It is a cornerstone to the US National Security Strategy of responding to two

nearly simultaneous major theater wars. A great deal of valuable information, to include DTS deficiencies, was collected on the various systems and relationships that make up the DTS.

In response to many of the emerging logistics issues, the Office of the Secretary of Defense developed the Fiscal Year 2000 Logistics Strategic Plan as a method to focus attention and resources on the need for improving logistics support to the warfighter as outlined in JV2020. In support of the FY2000 DoD Logistics Strategic Plan, each of the Services and a number of DoD Agencies to include USTRANSCOM have begun logistics transformation efforts.

Many of the logistics transformation efforts underway within the DoD, to include the USTRANSCOM Defense Transportation System Enterprise Architecture (DTS EA) and JV2020s requirement for "Web-Based Logistics," make use of the Extensible Markup Language (XML). XML is a web-based standard that is required by the Joint Technical Architecture (JTA) for use in any application that employs markup languages defined through tagged data items. Unfortunately, XML is a meta-language and as such requires extensive definition of semantic standards on the part of various industry groups, including the DoD. Current and draft DoD guidance attempts to address XML interoperability within the DoD, but falls short in addressing interfaces with industry standards. Consequently, DoD organizations such as USTRANSCOM struggle with semantic and interoperability issues while questioning the need to influence the IT standards development community in order to influence XML standards development.

Chapter 2

Background

Significance to the Warfighter

As a result of the 1999 review by USTRASCOM of the Defense Transportation System, a number of important shortcomings in the system were identified. Some specific deficiencies identified in the current environment are:[1]

Table 1 "As-Is" Defense Transportation System Deficiencies

There are a multitude of systems and applications performing the same functions with the same information but not necessarily the same data.
There is redundant data, the quality of which is questionable.
Users must shift from application to application looking for “nuggets” of information.
The ability to respond to new information requirements is slow and costly.

Because of these deficiencies, data is not always easily accessible. If the user (i.e. warfighter) cannot access data when needed, the data is useless. Data access must be easy and transparent to the user, especially in deployed environments. This can be accomplished with common applications that are tailored to the users’ needs. By separating the data from a particular application, the data becomes more accessible to all users no matter where they are located.

Redundant data is the consequence of multiple systems having been developed to satisfy specific requirements related to a Transportation Component Command (TCC) or

user community. This disparate view of systems makes it difficult to integrate data from multiple systems at a corporate level and provide an overall DTS systems picture. This lack of integrated data results in an inability to develop a common operating picture that provides for total asset visibility (TAV) throughout the DTS life cycle.

This failure in interoperability has been labeled the top priority for LtG Joseph K. Kellogg, the Director, Command, Control, Communications, and Computer Systems (J-6), The Joint Staff. In particular, the General sees interoperability to be particularly elusive at the coalition and joint task force operational levels. "Achieving interoperability at the joint task force level remains the biggest challenge facing the J-6," General Kellogg states. He explains that in today's American armed forces, "there are hundreds of vested systems" that cannot communicate with each other "and that is the problem," especially in an era when information is exploding.[2]

Accurate, up-to-date information concerning transportation and movement of forces, equipment and supplies into and out of the joint operations area (JOA) is critical to the success of a Joint Task Force (JTF).[3] Focused logistics will effectively link logistics functions with units by providing real-time total asset visibility. Information systems will incorporate analysis and planning tools with connections to the commercial sector to take advantage of applicable business practices and commercial economies. The result will be improved end-to-end management of the logistics system while providing real-time control of the transportation pipeline to support the joint force commander’s priorities. The joint force of the future will see an improved link between operations and logistics resulting in precise time-definite delivery of assets to the warfighter. This substantially improved operational efficiency, combined with increased warfighter confidence in these

new capabilities, will reduce sustainment requirements resulting in a reduced logistics footprint.[4]

XML - Where did it come from?

XML is a meta-language and as such can be viewed as grammatical rules for how we will talk, but it does not define what we will talk about. XML is an outgrowth of the Standard Generalized Markup Language (SGML) which was developed by IBM and became an approved standard of the International Organization for Standardization (ISO) in 1986.[5] SGML provides a means for document authors to separate the content of a document from its presentation. HTML is also an outgrowth of SGML, but was never intended to describe content, but instead simply defines page layout of text and pictures.

The World Wide Web Consortium (W3C) was founded in 1994 and is comprised of several hundred dues paying members, mostly corporations. The W3C formed a work group to study the issue of common semantics on the World Wide Web in 1996. The group looked at development of a simplified version of SGML in order to facilitate shared context over the Internet. A simplified version was needed as SGML was simply to complex to support automated processing of large quantities of Internet documents. The result was the XML 1.0 specification, released by the W3C in February 1998.

XML - What is it?

The XML approach to data and shared context is defined by XML documents and document type definitions (DTDs). XML tags are used in XML documents to define hierarchical elements and are used in a fashion similar to that of HTML. The DTD is a list of declarations that define the order, structure, and attributes of tags for a particular

XML document.[6] An XML document will reference its associated DTD, and if the document and its DTD are placed on the Internet, anyone can then access the DTD, interpret the rules and process the document.

Of significance is the fact that there is no way to enforce datatype restrictions on data content such as integers or floating point.[7] XML schemas address this shortcoming by describing data with the added benefit of being able to specify the datatype of that data using primitive types such as strings, integers, or dates. In addition, because XML schemas are valid XML documents, the same XML tool that reads the data also reads the definition for that data. When considering the data-oriented role that XML is beginning to assume in support of electronic business or e-business transactions, schemas appear to be the better suited for many industry implementations of XML.

XML has quickly garnered the attention of government and industry groups alike. The promise of universal data interoperability has caused many to view XML as the revolutionary solution to e-business. Unfortunately, XML only provides the grammar for this revolution. The words (i.e., XML tag sets) must still be defined.

Notes

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[3] Joint Publication 5-00.2, "Joint Task Force Planning Guidance and Procedures." 13 January 1999, VII-6.
[4] Joint Vision 2020, Director for Strategic Plans and Policy, J-5, Strategy Division. June 2000, 24.
[5] Dick, Kevin. XML, A Manager's Guide. Addison-Wesley Information Technology Series, 2000, 15.
[6] Ibid., 16.
[7] Ibid., 28.

Chapter 3

Analysis of Trends and Organizations

One standards organization takes years to reach consensus, while another standards organization takes months.[1] Changes in the information technology world occur on a daily pace, as do changes in the standards organizations that support information technology. Until the early 1990s, the standards development process was basically straightforward, comprised of academics, and tended to be somewhat time consuming. By 1993, the tide in standards development had shifted toward the Internet Engineering Task Force (IETF), and a number of consortia.

Historical Approach to Standards

The most famous and historically powerful standards body is the ISO. The ISO fosters agreement on international standards with an emphasis on international trade. Communications standards were handled by the International Telecommunications Union (ITU), a UN-treaty organization with representatives from national governments. Other international standards bodies include ECMA and the European Committee for Standardization (CEN).[2]

ISO is an independent organization for developing international agreements on standards with an emphasis on broadening international trade. ISO formally consists of national representatives, but in order to develop standards through the ISO technical

committees, hundreds of volunteers are required to participate.[3] Each technical committee in-turn relies on working groups to manage the development process. This process consists of the development of recommendations in the form of working drafts, then committee drafts, draft international standards, and finally international standards.[4] At each step, actors participate in a continuous cycle of correspondence that includes face-to-face meetings and balloting. Each national representative is allowed one vote at each level. The entire process from start to finish typically takes years to complete.

A New Methodology

In the early 1990s, changes began to occur in the IT standards development process. The arrival and subsequent acceptance of the Internet and World Wide Web dictated speed rather than consensus in the development of IT standards. This paradigm shift was embraced by IETF as it refined its standards development process.

The IETF is an international organization open to individuals or groups such as network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture.[5] IETF standards are different from ISO standards primarily because IETF is not part of a government backed standardization process.[6] IETF standards are also different from 'de facto' standards in that 'de facto' standards are not publicly developed but are widely used, such as MS-DOS. IETF standards are publicly developed and are widely used.[7] The closest analogy to the IETF in the realm of the Web is the W3C.

The W3C was created in October 1994 with the goal of developing common protocols that promote the evolution of the World Wide Web while ensuring its interoperability.[8] W3C has more than 500 member organizations from around the world

and has earned international recognition for its contributions to the growth of the Web.[9] Member organizations pay $50,000 for full-membership, or $5,000 for an affiliate membership. The W3C does not accept individual memberships.

The W3C is an international industry consortium founded at the Massachusetts Institute of Technology (MIT). W3C employs a standards development process that is prompt, but also attempts to build consensus. Technical reports are drafted by W3C Working Groups and submitted to the recommendation track for possible approval. Technical and public reviews follow, and if the specification meets relevant requirements, the W3C Director may choose to send the recommendation forward to the Advisory Committee. If issues and changes resulting from review by the Advisory Committees are minimal, and there is no dissent by the committee, the Director may choose to announce that the specification is approved as a recommendation. This entire process can be accomplished in as little as a few weeks. Months are more typical, but never years.

Like IETF, the various W3C working groups that create and publish IT standards wield the majority of power and influence. When officially approved by the W3C process, recommendations become the equivalent of official standards.[10] The W3C creates standards that are syntactic in nature, providing a level of structure to the Web, while riding on top of the more bit-oriented standards of the IETF. Meanwhile, the job of building semantic standards that exploit the W3C's syntactic standards rests with consortia such as the Organization for the Advancement of Structured Information Standards (OASIS).[11]

Two Approaches to Standards Development

The history of standards organizations can be categorized by two approaches to standardization: structuralists and minimalists. Minimalist's value simplicity and rapid acceptance by their user community. Structuralist's value comprehensive definition and precision while avoiding quickly developed provisional standards.

The Open Systems Interconnection (OSI) model is an example of the structuralist approach. Created by the ISO, the OSI model was developed to describe computer networking. OSI is comprised of seven layers, ranging from physical exchange of bits to the organization of data. Although universally acknowledged, it is rarely followed.[12]

The development of the Internet is a good example of the minimalist approach. The Internet grew as an idea by individuals who foresaw the power of arranging ideas in an unconstrained environment. Focused on a few good standards (e.g., TCP/IP, HTML) that provide the services required, the minimalist approach beat OSI at its own game.[13]

The comparison between the structuralist and minimalist approach to standards development provides an important contradiction. Successful standards tend to start small, not large.[14] The first version of HTML could be learned by even the novice user in a few hours. TCP/IP and the Structured Query Language's (SQL) rules can be succinctly described. By contrast, complex standards such as the OSI, Ada, and the Integrated Services Digital Network (ISDN) were born large, and the first two have largely failed, while ISDN continues to struggle for acceptance.[15]

The simplicity of HTML and JAVA has prompted their uptake on the Web. XML, by simplifying SGML, has given markup a new lease on life.[16] Many of the standards competing with XML (Electronic Data Interchange and Secure Electronic Transactions

for credit cards) are large and complex. This leads one to believe that XML would be readily embraced by industry, at least in support of electronic business. However, encapsulation of real-world semantics has proved to be much more difficult.[17] This has lead to the proliferation of consortia and with them a variety of XML standards (see Appendix B). Major business enterprises have embraced XML for financial reasons, but most small businesses have been shut out of the XML arena due to complexity and cost.

Notes

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[3] Rada, Roy. "Consensus Versus Speed." Information Technology Standards and Standardization: A Global Perspective. Edited by Kai Jacobs. Idea Group Publishing, 2000, 20.
[4] Ibid.
[5] Internet Engineering Task Force (IETF) home page. On-line. Internet, 1 February 2002. Available from http://www.ietf.org/
[6] Rada, Roy. "Consensus Versus Speed." Information Technology Standards and Standardization: A Global Perspective. Edited by Kai Jacobs. Idea Group Publishing, 2000, 23.
[7] Ibid.
[8] Berners-Lee, Tim. Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by Its Inventor. HarperCollins Publishers, Inc., 1999, 94.
[9] World Wide Web Consortium (W3C) home page. On-line. Internet, 1 February 2002. Available from http://www.w3.org/Consortium/
[10] Libicki, Martin C., Schneider, James, Frelinger, David, Slomovic, Anna. Scaffolding the New Web: Standards and Standards Policy for the Digital Economy. Document No: MR-1215-OSTP. RAND, Santa Monica, CA, 2000, 24.
[11] Ibid., 25.
[12] Ibid., 5.
[13] Ibid., 6.
[14] Ibid., 5.
[15] Ibid., 6.
[16] Ibid., 13.
[17] Ibid.

Chapter 4

Challenges to Common Semantics

The emergence of XML has brought with it a proliferation of standards consortia from every industry imaginable. Some estimate that a new industry consortium is founded every week, with one in four collecting a significant amount of capital in the form of membership dues.[1] The creation of these consortiums brings with them a proliferation of XML schemas. This may not be a problem for business-to-consumer purchases, where at least one end of the transaction involves a human, but for business-to-business transactions such as those in supply and transportation, it can be devastating.

The transportation industry recognized the importance of linkages between purchase requests and production systems long before the emergence of XML. As such, the transportation community was an early participant in the development of Electronic Data Interchange (EDI) standards. Carriers and large industrial manufactures have invested heavily in EDI over the past decades and consequently, EDI represents a stable and reliable method for information exchange.

Analysis of EDI

In a May 1988 policy memorandum, Deputy Secretary of Defense William Taft directed the DoD components to "make maximum use of EDI in all business related transactions." Specifically, the Military Traffic Management Command (MTMC) is

required to use the EDI Technical Trading Partner Agreement in all MTMC transportation services contracts.[2] Consequently, the DoD transportation community has primarily used the American National Standards Institute (ANSI) Accredited Standards Committee X12 EDI standard to support electronic exchange of business information.

The DoD transportation community has embraced EDI as the preferred method for conducting e-business transactions. However, EDI requires dedicated servers that can cost in the range of $10,000 to $100,000 apiece.[3] EDI also requires dedicated private networks and maintenance that can cost as much as $250,000 per month.[4] Some experts estimate as much as a $1 billion investment in developing EDI dialects.[5] Based on this level of investment, EDI is not going to be replaced by XML in the near future. So, why should corporations or DoD communities make the transition from EDI to XML?

EDI is a complex technology. It enables machine-to-machine communication, but presents data in a non-human readable format. Only an experienced EDI programmer can decipher a purchase order number from an EDI-formatted message, but the same element in an XML document clearly reads as a purchase order. In addition, adding new business partners using traditional EDI requires customized mapping of each new partner's document format.

A possible solution incorporates a new standard called the Value Chain Markup Language, or VCML. VCML is one of the first attempts to conduct business-to-business transactions using XML while retaining the structure and business rules embedded within EDI. VCML is essentially an XML schema for EDI specific meta-data. [6]

XML resolved the problem of dedicated connectivity charges associated with EDI, but it did not solve the problems of back-end integration.[7] Instead, it made the problem

worse due to the proliferation of XML dialects. Many actors in the business industry believe that XML standards bodies need to do a better job of leveraging industry infrastructure, which is why VCML seems so attractive.

Analysis of ebXML

VCML is by no means the only XML-based standard focused on business transactions. The Electronic Business XML (ebXML) initiative, a joint project sponsored by UN/CEFACT and OASIS, brought together business and technology experts to build a common set of specifications to make e-business possible across multiple industries.

The ebXML "Terms of Reference" document states that the purpose of ebXML is "to research and identify the technical basis upon which the global implementation of XML can be standardized".[8] The primary goal for ebXML is to "provide an open technical framework to enable XML to be utilized in a consistent and uniform manner for the exchange of Electronic Business data in application to application, application to person and person to application environments."[9] Of significance is not what the "Terms of Reference" say, but what they do not say. EbXML is not about creating standardized DTDs or schemas that support common business documents such as invoices or purchase orders. EbXML is instead about creating an e-business infrastructure.

The ebXML standard is based on a five-layer architecture that provides businesses the ability to exchange e-business messages, communicate data in common terms, and define and register business processes. The five layers that define ebXML are: Messaging, Trading Partner Profile (TPP), Registry/Repository, a Core Component, and a Business Process component.

EbXML has been embraced by a number of industry groups. The Global Commerce Initiative (GCI) plans to use ebXML as the backbone of their new data exchange standard for business-to-business trade in the consumer goods industry. The international travel consortium, OpenTravel Alliance (OTA), has endorsed ebXML in its new trade specification. Recently, Covisint, a global solutions provider collaborating with the automotive industry, announced its plan to use ebXML. Although these endorsements of ebXML are certainly encouraging for the founders of ebXML, it is hardly a global endorsement for what was to be the global specification for e-business.

Analysis of Transportation Based XML

In an attempt to develop the first standards-based logistics network, Logistics.com Inc. has introduced the Logistics Event Management Architecture (LEMA). This architecture is based on the transportation XML or tXML. TXML is a superset of the EDI transaction set and is related to transportation procurement and execution.[10] The LEMA vision is a seamless flow of information among supply chain and logistics community members as well as adjacent industry participants such as providers of information technology and services.

After reviewing the many press releases on Logistics.com's web site, it is obvious that multiple leading shippers are using Logistics.com's various solutions to support their transportation requirements. Gillette, Central Freight Lines, Stevens Transport, and Compact Computer all make use of Logistics.com's technology. These solutions should be considered when developing new logistics solutions as envisioned by the DoD.

Another transportation based XML specification is tranXML. Developed by Transentric, tranXML provides a common XML vocabulary to support supply chain

activities. TranXML is seen as a complement to existing EDI infrastructure and a good solution for those developing XML based transportation functions.[11] This is due to the fact that EDI formats such as X12 and EDIFACT form the basis for tranXML.

TranXML has not garnered the level of industry acceptance that Logistics.com's technology seems to have gained. However, DaimlerChrysler and Union Pacific did announce last year the formation of a new company that will use the Internet to provide total visibility of vehicles through the usage of tranXML.[12]

Notes

[1] Libicki, Martin C., Schneider, James, Frelinger, David, Slomovic, Anna. Scaffolding the New Web: Standards and Standards Policy for the Digital Economy. Document No: MR-1215-OSTP. RAND, Santa Monica, CA, 2000, 15.
[2] EDI Technical Trading Partner Guide for Defense Transportation. Headquarters, Military Traffic Management Command. November 2001. On-line. Internet, 1 February 2002. Available from http://www.mtmc.army.mil/CONTENT/2494/TPA.pdf, 4.
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Chapter 5

DoD Trends in XML Management

Numerous actors within the DoD have embarked down the XML path. Draft DoD policy states, "the Joint Technical Architecture requires the use of XML for any domain and application specific markup language defined through tagged data items." The proliferation of XML specifications throughout industry and the DoD is driving the requirement to manage XML DTD and schema development to ensure interoperability and reduce redundancy. Following industry, the DoD has established an XML repository and plans to collect, store, and disseminate XML components. This repository is being implemented and managed by the Defense Information Systems Agency (DISA).

Defense Information Systems Agency Registry

DISA has drafted the "Implementation Plan for DoD XML Registration." The Implementation Plan states, "this registry is designed to act as a clearinghouse through which industry and government coordination on XML technology and related data issues can be advanced." The plan goes on to state that it is not the purpose of the plan to define and impose semantic standards on the diverse community of XML users within the DoD. Although this is a good idea, the result will most likely follow industry with the proliferation of multiple standards that still suffer from overlap and lack of semantic interoperability.

The DoD registry is based on the XML concept of "namespaces." XML namespaces are a W3C recommendation the enables developers to avoid naming collisions by assigning XML element and attribute names to a namespace.[1] XML makes use of a reconciliation document that consolidates information (elements and attributes) and is identified by a unique name, which is a URI or Uniform Resource Identifier. Therefore, any attribute name or element type in an XML namespace can be identified by a two-part name: the name of its XML namespace and its URI.

Because namespaces constitute a collection of data that share a common context, namespaces can be used as an administrative tool in the management of various industry communities. DISA has chosen to follow this route in managing XML specifications. Through its XML registry, DISA will allow namespace mangers to publish their XML specifications in order to share XML specifications among various developers.

The DoD XML registry list of namespaces can be found at Appendix A. The transportation community is represented primarily by the transportation and logistics namespaces, as well as the supply, acquisition logistics, and combat support namespaces.

Department of the Navy (DON) interim policy concerning the use of XML is documented in a 6 September 2001 memorandum signed by the Navy Chief Information Officer (CIO). The policy applies to both the Navy and Marine Corps, and states, "it is the policy of the DON to follow approved W3C recommendations." This includes both the W3C XML 1.0 and W3C XML Schema recommendations. DON policy requires Navy and Marine Corps XML developers to make us of existing XML components within the DoD registry maintained by DISA.

In reviewing the DISA and DON policy, it seems apparent that the DoD's plan for improving XML interoperability while reducing redundant XML implementations is focused on usage of the DoD XML registry. The main thrust of the DoD XML registry is to provide visibility and awareness of XML components to various developers working within the DoD. It is very important to note that commercial next generation e-business frameworks such as ebXML are building registry functionality into their frameworks, which have a different application and utility than the current DoD XML registry. Furthermore, the concept of having a single XML registry for all of DoD's functional areas will be extremely difficult to manage. Simply observing an XML example illustrates the difficulty in building this type of registry with the vision of XML interoperability tied to it. The three XML fragments in the figure below are each valid ways of expressing data in XML. Each is well formed based on the W3C XML specification, but each makes use of different XML structures. Consequently, they are not interoperable.

```
<lat_deg>30N</lat_deg>
```

```
<latitude units="degrees" hemisphere="north">30</latitude>
```

```
<latitude>
  <hemisphere>N</hemisphere>
  <degrees>30</degrees>
</latitude>
```

Figure 1 XML Interoperability Example

Draft DoD XML policy also mentions that the DoD XML registry should promote the establishment of partnerships with industry and public interest groups. It goes on to state that DoD entities should adopt commercial over DoD unique standards and registries wherever possible. Finally, it mentions the need to harmonize standards and registries among industry and government organizations. So, how does the DoD migrate

towards XML interoperability? Clearly defined data requirements, data sources, and common standards to access data are required before XML can support true interoperability. A real-world example illustrates the complexity of this task.

USTRANSCOM "To-Be" Enterprise Architecture

The Defense Transportation System is that portion of the global transportation infrastructure that supports DoD transportation needs. The DTS consists of both military and commercial transportation assets and systems, and thus extends beyond the boundaries of USTRANSCOM and its component commands.

In 2001, USTRANSCOM/J6 published the "To-Be" DTS Enterprise Architecture (EA). The “To-Be” DTS EA is designed to support the global strategic mobility mission of USTRANSCOM by defining an architecture that provides an end-to-end transportation system. Each layer of the DTS EA (presentation, computing, and communications) builds upon the other and is to be viewed as a part of the whole enterprise system.

The "To-Be" DTS supports the DoD distribution process through five newly defined movement types: deployment/redeployment, sustainment, medical patient, personal property, and special.[2] The DoD distribution process is initiated with the generation of a requirement, typically by a DoD depot, a vendor, an installation, or a mobilization site. The required item will then move through a port of embarkation (POE) to a port of debarkation (POD) with follow-on in-theater movement to the final destination.

Critical to the DoD distribution process are various command and control (C2) activities and systems that will allow for continuous monitoring of distribution activities. Total asset visibility is critical to this process and gives the Supported Commander confidence in the ability of the distribution process to move personnel and equipment

where required to accomplish the mission. With this confidence, the Supported Commander can concentrate on the warfighting mission.

An important objective of JV2020's Focused Logistics concept is to provide the joint force commander the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity. The Focused Logistics vision for this objective is to employ a web-based system that provides TAV, thus linking the logistician with the operator across services and support agencies.[3]

Critical to this task of TAV are the concepts of web-based "portals" and "visualization tools." Customizable portals allow users to bring together tools and applications that fuse information required for decision making. The portal allows a user to access the DTS at a single point and acquire needed information no matter where the user is located. Portals will allow for understanding and analyzing transportation requirements, scheduling, and controlling transportation assets such as trucks, planes, and ships.[4] The portals are associated with standard tool sets that allow for visualization of data as information. These tool sets will be customizable based on user information needs. By focusing on the information rather than the display, USTRANSCOM will reduce the need for numerous application development efforts.

The USTRANSCOM vision for portals and visualization tools are encompassed within the DTS EA Corporate Data Environment (CDE). The CDE proposes a data management process that separates the design and maintenance of databases from the applications that analyze and display that data. A critical standard that is used to accomplish this task is XML. The power of XML is that it allows for the separation of structured data from the user interface. This separation allows for the integration of data

from a diverse array of sources. Customer information, purchase orders, bill payments, scheduling data, and other information can all be converted to XML allowing data to be easily transferred via the web.[5] The CDE is shown in Appendix C.

The development of web based portals supporting the DTS will provide a single point of service for the warfighter customer. The web portal will be the centralized source for transportation services with links to the USTRANSCOM component commands. DTS EA is focused on the warfighters' needs for Information Superiority. It presents a globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating and managing information on demand to warfighters, policy makers, and support personnel.[6]

Notes

[1] Dick, Kevin. XML, A Manager's Guide. Addison-Wesley Information Technology Series, 2000, 50.
[2] "To-Be" Defense Transportation System Enterprise Architecture Operational View. Headquarters, USTRANSCOM. 11 January 2001. On-line. Internet, 1 February 2002. Available from http://www.transcom.mil/J6/j6a/tcj6aa.html, 1-12.
[3] Ibid., 1-15.
[4] "To-Be" Defense Transportation System Enterprise Architecture Technical View. Headquarters, USTRANSCOM. 11 January 2001. On-line. Internet, 1 February 2002. Available from http://www.transcom.mil/J6/j6a/tcj6aa.html, 3-61.
[5] Ibid., 3-55.
[6] "To-Be" Defense Transportation System Enterprise Architecture Overview. Headquarters, USTRANSCOM. 11 January 2001. On-line. Internet, 1 February 2002. Available from http://www.transcom.mil/J6/j6a/tcj6aa.html, 1.

Chapter 6

Recommendations

After reviewing the current state of IT standards development, the proliferation of XML standards, and some of the more prevalent XML trends in DoD, it is apparent that the DoD transportation community will be influenced by XML. Just how organizations such as USTRANSCOM will manage their involvement with XML is still to be defined. Some possibilities include:

- Attempt to manage proliferation,
- Participate in consortia,
- Adapt appropriate industry standards,
- Build their own XML standards where needed.

Attempt to Manage Proliferation

As mentioned before, the history of standards organizations can be categorized by two approaches to standardization: structuralists and minimalists. Minimalist's value simplicity and rapid acceptance by their user community. Structuralist's value comprehensive definition and precision in the description of standards. Many of today's XML specification organizations have taken the minimalist approach, resulting in a proliferation of specifications.

A common approach to the problem of numerous XML specifications is the creation of consortia that develop and maintain repositories of XML vocabularies. These consortia are usually comprised of vendors and consumers assembled to work through interoperability problems between products or among software families.

Obviously, a USTRANSCOM sponsored consortia of vendors and consumers, although possible, would be difficult to manage. A more likely group would be an XML users group comprised of program managers, developers, and systems users unique to the DoD. The USTRANSCOM DTS EA is comprised of over 45 systems that are planned for migration. As such, the establishment of an XML working group would encompass a significant number of personnel. In addition, the time frame for the DTS EA migration is 2001-2005, which is actually rather short when considering the scope of the effort.

Participate in Consortia

Participation in consortia is a common practice within industry, especially by corporations that have a financial interest in the adoption of certain XML specifications. One possibility is participation in the Business Internet Consortium (BIC). BIC was created as an open industry group made up of leading e-business providers and users. The mission of BIC is to accelerate the transition to e-business by serving as an open forum for the exchange of ideas, providing customers an opportunity to influence e-business solutions, and recommending standards and best practices.[1] Participation in BIC as a member of the Customer Advisory Board is simple and does not require a fee.

OASIS is the most prevalent of the XML consortia, with its endorsement of the ebXML specification. OASIS participation can range in cost from as little as $250 per year for an individual, to $9,500 for a corporate sponsor membership. Joining the OASIS

community can provide the opportunity to interact with many of the XML industry's experts. Membership in OASIS will provide for involvement in and coordination with XML development efforts around the world while allowing members to stay current with inside information on the OASIS members-only web site. These activities may seem trivial, but sometimes simply attending standard-setting meetings in order to ensure a "consensus" that is adverse to your interests is not adopted can go a long way in protecting your interests.

Of particular interest to the USTRANSCOM DTS EA effort is the January 2002 formation of the OASIS Web Services for Remote Portals (WSRP) Technical Committee (TC). The WSRP TC will work toward an XML and web service standard that will allow for the "plug-n-play" of portals, web applications that aggregate content and applications from diverse sources. The TC will work with other OASIS TCs and attempt to harmonize WSRP with existing web application programming models, the work of the W3C, emerging web services standards, and with the work of other appropriate business information bodies.[2]

Many industry experts see the work of the OASIS WSRP TC as a critical first step in defining the ways in which Web services are exposed to end users. Based on USTRANSCOM's approach of implementing portals as a means for providing TAV, the WSRP appears to be an appropriate industry group for USTRANSCOM DTS EA developers to interact with on a regular basis.

Adopt Appropriate Industry Standards

Another alternative is to wait on the sidelines to see which XML standards the majority of businesses in the transportation industry ultimately adopt. Based on DoD

success in past standards such as Ada and CALS (Continuous Acquisition and Life-cycle Support), it may be the best course of action to lag behind industry and search the commercial realm for good XML solutions.

Transportation consortia focused on XML standards have been slow to form. The most significant work has been done in the area of e-business with the development of standards such as VCML and ebXML. These standards are of significance to USTRANSCOM, with its heavy reliance on commercial transportation providers and associated EDI technology. It is unclear, however, as to what level of customer visibility into the distribution process the adoption of these standards would provide.

Clearly, multiple XML specifications of interest to USTRANSCOM exist within commercial industry and at the DoD registry. A thorough review of these specifications should be accomplished to determine their appropriateness for usage in the DTS EA.

Build Their Own XML Standards Where Needed

Another possibility would be to work toward a common transportation language that crosses the boundaries of USTRANSCOM and its commercial partners. This language could then be used to move toward a common USTRANSCOM XML schema.

As part of the CDE, USTRANSCOM has development the Transportation Logical Data Model (TLDM). The TLDM could be a starting point for the definition of common semantics associated with transportation. Of course, gaining consensus across and outside of USTRANSCOM is no easy task. Another concern is that the TLDM is only a logical data model. The appropriateness of a logical data model as a starting point for XML schema development is questionable, as the various physical data models currently employed by the DTS will be the primary sources for data in support of TAV.

Another area of concern when dealing with standards and specifications is the historical context of DoD involvement. The DoD has essentially followed one of three paths in standards development: 1) lead by creating a new standard, 2) lag behind and search the commercial realm for good solutions, or 3) mandate a separate convention that differs from what others are doing. The third choice is often the unintended result of attempting to accomplish the first and by laying claim to the second.[3] Separate conventions are often the worst because they separate and divide the defense production base from the commercial production base. Given the extensive reliance DTS has on commercial transportation systems, dividing transportation providers could have damaging consequences.

Notes

[1] XML Coverpages, home page. On-line. Internet, 1 February 2002. Available from http://xml.coverpages.org/bicXMLConvergence.html.
[2] Organization for the Advancement of Structured Information Standards (OASIS), home page. On-line. Internet, 1 February 2002. Available from http://www.oasis-open.org/
[3] Libicki, Martin C. *Standards, The Rough Road to the Common Byte*. National Defense University, Ft. McNair, Washington D.C., May 1995, 23.

Chapter 7

Conclusion and Summary

Based on the issues raised in review of the "As-Is" DTS, and the vision for TAV outlined under the concept of Focused Logistics as defined in JV2020, this research paper addressed two important questions regarding the use of XML in logistics transformation efforts. First, what are the current industry and DoD trends in transportation related XML standards development, and second, should USTRANSCOM attempt to influence XML standards organizations in its use of XML to support DTS.

This paper provided an objective review of past and current trends in standards development, in particular Internet-based standards. The research determined that a minimalist approach that values simplicity and rapid acceptance by their user community, although successful in support of the emergence of the Internet, has resulted in a proliferation of XML specifications typically stored in on-line repositories. Additional research has shown that USTRANSCOM began migration to a DTS Enterprise Architecture that makes critical use of XML to support user portals and visualization tools. These portals will provide real-time, web-based user access to transportation data resulting in the Focused Logistics vision for total asset visibility. Also of significance is the discovery that USTRANSCOM and MTMC are major users of EDI.

When considering the proliferation of XML specifications, USTRANSCOM reliance on EDI, and DTS EA focus on the use of web-portals to accomplish TAV, a number of recommendations become clear.

The proliferation of XML specifications is driving the XML incongruency seen across various industry communities. The various EDI related XML schemas have seen some acceptance while the transportation based XML tag sets have not been widely embraced. As such, USTRANSCOM should focus on a comprehensive review of their component commands EDI usage in both inter- and intra-DoD electronic business. Based on this review, USTRANSCOM would then be able to identify key commercial vendors that provide services to USTRANSCOM. This, in-turn, would lead to the identification of accepted commercial XML standards, both EDI and non-EDI based, that are employed by key USTRANSCOM vendors, and as a result, should be considered for adoption by USTRANSCOM.

Critical to this task would be the establishment of a USTRANSCOM XML/EDI users group. DTS EA encompasses over 45 systems. Consequently, coordination among system program managers and data administrators is critical to the success of DTS EA. This users group would provide insight into where commercial standards could best support XML implementation. The users group would also be an important starting point in solving the problem of common XML semantics across USTRANSCOM systems.

Finally, the need for USTRANSCOM to influence commercial XML standards development is important. The recent establishment of the OASIS Web Services for Remote Portals Technical Committee is of critical importance to the success of USTRANSCOM's DTS EA web-based portals when considering that significant portions

of TAV may require access to commercial transportation carriers. As such, USTRANSCOM should consider joining OASIS and interacting with the Web Services for Remote Portals Technical Committee.

In summary, USTRANSCOM and Focused Logistics will be influenced by XML. Ultimately, XML has the potential to deliver TAV to the joint task force commander. However, TAV necessitates clearly defined information requirements by the warfighter while XML requires clearly defined information. It is only through careful management of both information requirements and information definition that the vision of Focused Logistics will become reality.

Appendix A

DOD XML Registry v2.1 - NAMESPACES

Namespace	Status
ACQ - Acquisition Logistics	Approved
AOP - Aerospace Operations	Approved
CFM - Configuration Management	Approved
COE - COE	Approved
CSS - Combat Support	Approved
CXP - Controlled Exports	Approved
ENT - DoD Enterprise	Developmental
FIN - Finance and Accounting	Approved
GEO - Geospatial and Imagery	Approved
GMI - General Military Intelligence	Approved
GOP - Ground Operations	Approved
LOG - Logistics	Approved
MET - Meteorological and Oceanographic	Approved
MSG - Messages	Approved
PDT - Product Data	Approved
PER - Personnel	Approved
SEG - System Engineering	Approved
SUP - Supply	Approved
TAR - Tracks and Reports	Approved
TBD - To Be Determined	Developmental
TRP - Transportation	Approved

Appendix B

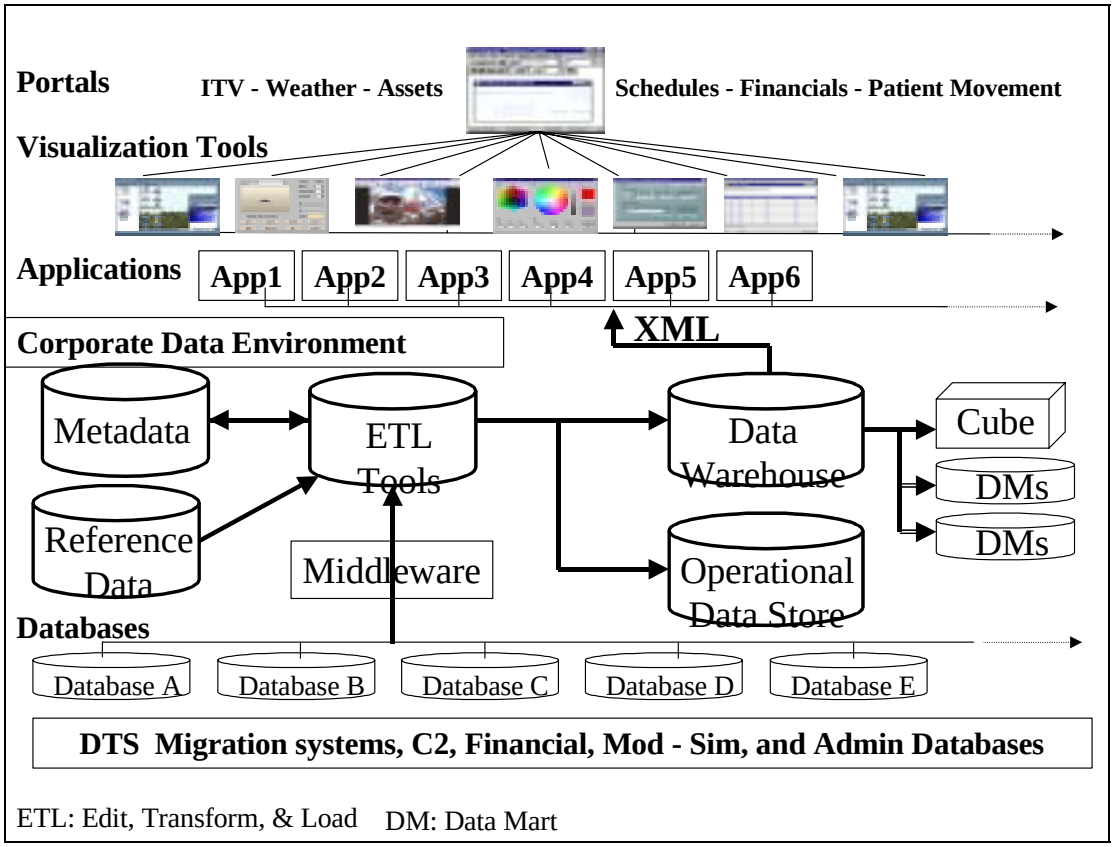
Industry Sectors - XML in Vertical Industries

Accounting (5)
Advertising (6)
Aerospace (22)
Agriculture (3)
Arts/Entertainment (26)
Astronomy (15)
Automotive (12)
Banking (10)
Biology (4)
Business Services (3)
Catalogs (6)
Chemistry (4)
Computer (7)
Construction (9)
Consulting (16)
Customer Relation (6)
Customs (2)
Databases (8)
E-Commerce (57)
EDI (19)
ERP (4)
Economics (2)
Education (44)
Energy/Utilities (22)
Environmental (1)
Financial Service (55)
Food Services (3)
Geography (2)
Healthcare (15)
Human Resources (23)
Industrial Control (3)
Insurance (6)
Internet/Web (24)
Legal (10)
Literature (14)
Manufacturing (3)
Marketing/PR
Math/Data
Mining (10)
Multimedia (25)
News (10)
Other Industry (4)
Professional Service (6)
Public Service (3)
Publishing/Print (28)
Real Estate (15)
Religion
Retail (6)
Robotics/AI (5)
Science (63)
Security (1)
Software (78)
Supply Chain (24)
Telecommunications (24)
Translation (8)
Transportation (7)
Travel (4)
Waste Management
Weather (6)
Wholesale
XML Technologies

Source: http://www.xml.org/xml/industry_industrysectors.jsp

Appendix C

Defense Transportation System Enterprise Architecture
Corporate Data Environment (CDE)



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